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# NASA TECH BRIEF

## *Goddard Space Flight Center*



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### Simple Two-Speed Tape Transport Drive

#### The problem:

Reduce the mechanical complexity of an existing two-speed tape transport drive; lower the assembly cost and increase the reliability.

In the existing transport, a 32 to 1 ratio in playback-to-record tape speeds required a planetary drive system of belts, shafts and pulleys. Once-around frequencies in bearings, pulleys, and shafts, nutation frequencies in bearings, and dirt pickup all contributed to flutter and to the complexity of the assembly.

#### The solution:

Fit an existing two-speed synchronous hysteresis motor to a High Data Rate Storage System (HDRSS) B tape transport. The flutter is reduced and the mechanical assembly greatly simplified.

#### How it's done:

The two-speed synchronous hysteresis motor uses a single frame and a single shaft. A speed of 375 rpm is obtained by applying a 100 Hz driving voltage to 32 poles; 12,000 rpm is reached by applying a 400 Hz voltage to 4 poles.

The old and new drive systems were compared directly, using successive testing on the same tape transport with the original two-speed drive arrangement. The two-speed motor was then mounted on the transport to replace the planetary drive sub-assembly. A pulley was placed on the transport capstan so that a belt driven by the motor shaft would drive the capstan at tape speeds of 42.88 in./sec for a 12,000 rpm motor speed and 1.34 in./sec for a 375 rpm motor speed. This configura-

tion was then tested for 200 hours under the same conditions as for the original configuration. Playback flutter with the two-speed motor was 1.4%, compared to 3% with the old drive system.

Through the use of the two-speed motor, three shafts, four belts, one brake, eleven bearings, and one motor were eliminated, materially reducing the mechanical complexity of the assembly, decreasing the cost, and increasing the reliability. If dynamic braking were to be incorporated, the remaining brake could be eliminated.

#### Notes:

1. This motor could be used on any tape recorder or similar device having a two-speed ratio of up to 32 to 1.
2. The following documentation may be obtained from:

National Technical Information Service  
Springfield, Virginia 22151  
Single document price \$3.00  
(or microfiche \$0.95)

#### Reference:

NASA CR-112400 (N70-36364), Nimbus-D  
High Data Rate Storage System

#### Patent status:

No patent action is contemplated by NASA.

Source: S.P. Clurman and G.L. Stitley of  
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